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ABSTRACT

This curriculum guide provides materials for teachers to use in developing a 1- or 2-year course in agricultural mechanics for at-risk and special education students. It is one of 28 semester courses in agricultural science and technology for Texas high schools. The program prepares low-achieving students with employability skills that are transferable among agricultural mechanics-related occupations or into other vocational programs. The course guide is organized in four sections. The first section lists essential elements common to all agricultural science and technology/agricultural business courses. The second section lists the essential elements for agribusiness. The third section lists the units and topics of instruction and suggested time allocations for each unit and topic. Listed also are the catalog numbers of corresponding curriculum materials available from the Instructional Materials Service of Texas A&M University. Topics covered in the course include the following: safe work practices in agricultural mechanics-related occupations, fasteners and building materials, planning and constructing buildings and equipment, selecting and applying paint and preservatives, maintenance and use of electrical wires and motors, concrete and masonry construction, electric arc and oxyfuel welding and soldering, small engine operation and repair, maintenance of agricultural trucks and machinery, planning and conducting leadership activities related to agricultural mechanics-related occupations, and planning and conducting supervised agricultural experience programs. The final section of the guide provides topic goals and objectives targeted for the completion of the topic. (KC)

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CURRICULUM GUIDE
FOR
AGRIBUSINESS 121 - AGRICULTURAL MECHANICS

FARM AND RANCH MECHANICAL REPAIR / VEH FARM AND RANCH MAINTENANCE

DEVELOPED

BY

INSTRUCTIONAL MATERIALS SERVICE

DEPARTMENT OF AGRICULTURAL EDUCATION

TEXAS A & M UNIVERSITY

IN

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DIVISION OF VOCATIONAL AND APPLIED TECHNOLOGY EDUCATION

AUSTIN, TEXAS

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PREFACE

Agribusiness 121 - Agricultural Mechanics includes both the Farm and Ranch Mechanical Repair course (12630121) and the VEH Farm and Ranch Maintenance course (13630121).

The Farm and Ranch Mechanical Repair course is a 1 to 2 year pre-employment laboratory program of 1 to 3 units for students in grades 9 through 12. This program is designed for students one or more years below grade level in achievement in three or more academic courses, or below grade level as evidenced by the score at or below the 25th percentile on a standardized test at the time of enrollment.

One-hour pre-employment classes may be offered only in ninth grade. A student may enroll for more than one year, if the school district feels the student will benefit from the course.

The Farm and Ranch Mechanical Repair course prepares students with employability skills which are transferable among agricultural mechanics related occupations. It retains 'at risk' students in school by providing successful educational experiences. The course also prepares students for entry into other vocational programs.

The Farm and Ranch Mechanical Repair course includes the essential elements common to all agricultural science and technology courses. In addition, it includes the essential elements, concepts and skills related specifically to agricultural mechanics related occupations.

The VEH Farm and Ranch Maintenance course is a 1 to 2 year VEH pre-employment laboratory program of 1 to 2 units for students in grades 7 through 12. This program is designed for handicapped students whose greater degree of impairment precludes integration into the regular or CVAE vocational education class.

The VEH pre-employment laboratory program is a more restrictive placement for the more severely handicapped who are in special education programs. Students in this program are instructed with a specially designed curriculum and may participate in special education classes for more than 50% of the instructional day.

One-hour VEH pre-employment classes may be offered only in the seventh through ninth grades.

The units and topics of instruction, and the goals and objectives are based on recommendations by members of the State Advisory Committee for Agribusiness 121 - Agricultural Mechanics courses.

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FOR
AGRIBUSINESS 121 - AGRICULTURAL MECHANICS

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USING THE

CURRICULUM GUIDE

FOR

AGRIBUSINESS 121 - AGRICULTURAL MECHANICS

Pages 1 through 2 of this guide list the essential elements common to all agricultural science and technology courses. A list of essential elements specific to Agribusiness 121 is on page 3.

Pages 5 through 9 contain a list of units and topics of instruction and suggested time allocations for each unit and topic. The 'periods of instruction' listed for each unit and topic are for a one unit course.

Also listed are catalog numbers of Instructional Material Service (IMS) curriculum materials that teachers may use in teaching the topics and satisfying the essential element requirements. Materials listed in the Level I column are more basic than those materials listed in the Level II column. More than one suggested item of curriculum materials may be listed for effective instructional presentation on some topics. If all suggested curriculum materials from either column are used, the essential elements requirements for a one unit course will be met.

The final section (pages 11 through 33) in the guide provides topic goals and objectives to be met upon completion of each topic. Also shown with the topic goals and objectives are the corresponding IMS curriculum materials listed on the units and topics of instruction page. The catalog numbers listed on the left side of the '/' mark are the level I materials. Catalog numbers listed on the right side of the '/' mark are the level II materials. This section should be particularly useful to teachers in preparing lesson plans and selecting materials to meet individual student's needs.

Teachers should provide a more detailed presentation of the subject matter for students enrolled in the courses for additional (2 or 3) units of credit. Most student material topics contain skill and/or enhancement activities. Teachers may assign these activities to meet the requirements of a two or three unit course.

Each student material topic contains a list of references used in its development. If a more detailed presentation of subject matter is necessary, the teacher may acquire some of these references from IMS and/or from the publishers cited in the reference section of each topic.

S_S75.82 Agricultural Science and Technology/Agricultural Business

(a) The elements in this subsection are common to all agricultural science and technology courses unless otherwise indicated and shall be included in each course at the appropriate level. Every school offering agricultural science and technology shall provide courses which include the following essential elements:

(1) Leadership concepts and skills. The student shall be provided opportunities to:

(A) demonstrate skills, characteristics and responsibilities of leaders and effective group members;

(B) demonstrate a knowledge of parliamentary procedure principles;

(C) plan and conduct leadership activities; and

(D) prepare for effective citizenship and participation in our democratic society.

(2) Concepts and skills related to successful employment and/or post secondary training. The student shall be provided opportunities to:

(A) identify employment opportunities and preparation requirements in chosen field;

(B) identify effective methods to secure and terminate employment;

(C) demonstrate effective communication skills both oral and written and follow through on assigned tasks;

(D) demonstrate dependability and punctuality;

(E) demonstrate productive work habits and attitudes;

(F) understand the importance of taking pride in the quality of work performed;

(G) recognize the dignity in work;

(H) develop skills in planning and organizing work;

(I) apply required methods and sequences when performing tasks;

(J) apply principles of time management and work simplification when performing assigned tasks;

(K) identify ethical practices and responsibilities; and

(L) understand the importance of the application of organization policies and procedures.

(3) Concepts and skills associated with entrepreneurship. The student shall be provided opportunities to:

(A) identify opportunities for business ownership;

(B) understand the risk and profit motive factor;

(C) understand the elements and advantages of the free enterprise system; and

(D) explain the role of small business in the free enterprise system.

(4) Concepts and skills related to safety and safe working conditions. The student shall be provided opportunities to identify and apply safe working practices to all training situations.

(5) Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:

(A) understand the importance of maintaining good health and proper appearance for effective job performance;

(B) understand oneself and others;

(C) exercise self-control;

(D) accept and use criticism;

(E) recognize basic human relationships as they relate to business success; and

(F) demonstrate characteristics for successful working relationships.

(6) Concepts and skills related to personal and business management. The student shall be provided opportunities to:

(A) explain how management assists in reaching personal and family goals;

(B) explain the management process;

(C) describe the role of management in controlling stress;

(D) identify and understand personal checking accounts;

(E) identify and understand personal loan application processes;

(F) identify and understand different financial institutions;

(G) identify the role and functions of business management;

(H) understand the lines of authority; and

(I) identify effective supervisory techniques.

(7) Concepts and skills related to supervised agricultural activities. The student shall be provided opportunities to plan and conduct/perform supervised agricultural activities.

(dd) Agricultural Business 121 - Agricultural Mechanics (1-3 unit) shall be a shop/laboratory-oriented course that includes the essential elements, and the concepts and skills related to agricultural mechanics. The student shall be provided opportunities to:

(1) identify and safely use hand and power tools;

(2) identify and use fasteners and building materials;

(3) plan and construct buildings and equipment;

(4) read building plans;

(5) compute bill of materials;

(6) select and apply paint and preservatives;

(7) perform skills needed to install and maintain agricultural water supply and sanitation systems;

(8) perform electrical wiring, care, and maintenance of electric motors;

(9) estimate amount needed, forms, reinforcing, placing, finishing, and curing of concrete;

(10) perform electric and oxyfuel welding and soldering;

(11) service and repair small engines;

(12) service and maintain the air cleaner, lubrication, cooling, fuel, ignition, power train, braking, hydraulics, steering, and tires for farm trucks and tractors;

(13) perform farm machinery and equipment inspection, adjustments, and reconditioning;

(14) plan, build, and maintain fences;

(15) recognize safe work practices that apply to farm and ranch mechanical repair;

(16) plan and conduct leadership activities and explore career opportunities related to farm and ranch mechanical repair; and

(17) plan and conduct supervised agricultural experience programs, to include personal financial management, and explore entrepreneurial opportunities.

AGRIBUSINESS 121 - AGRICULTURAL MECHANICS

Units and Topics of Instruction	Periods of Instruction	Essential Elements	Student Materials Level I	Student Materials Level II
A. Recognize and Practice Safe Work Practices That Apply to Agricultural Mechanics Related Occupations	12			
1. Agricultural Mechanics: Importance, Safety, and Laboratory Management	2	(a)(4),(dd)(1) (dd)(15)	8147-A	8600
2. Identify and Demonstrate Safe Use of Hand Tools	4	(a)(4),(dd)(1) (dd)(15)	8147-B	8412
3. Identify and Demonstrate Safe Use of Power Tools	4	(a)(4),(dd)(1) (dd)(15)	8147-C	8601-A
4. Identify and Demonstrate Proper Use of Farm and/or Builder's Level	2	(dd)(1)	8147-D	8771
B. Identify and Use Fasteners and Building Materials	6			
1. Identify and Demonstrate Safe Use of Fasteners	2	(dd)(2),(dd)(15)	8148-A	8617,8792-C
2. Identify and Select Wood and Other Building Materials	2	(dd)(2)	8148-B	8229-B,8413
3. Identify and Select Concrete and Masonry Building Materials	2	(dd)(2)	8148-C	8230-A,8230-B 8769
C. Plan and Construct Buildings and Equipment	18			
1. Planning Buildings and Selecting Equipment	3	(dd)(3)	8149-A	8229-A,8229-B
2 Drawing and Reading Building Plans for Cost Effective Construction	3	(dd)(3),(dd)(4)	8149-B	8605-B,8786-A
3. Computing a Bill of Materials	3	(dd)(3),(dd)(4) (dd)(5)	8149-C	8413,8229-B 8605-B,8786-A
4. Construction of Agricultural Structures	9	(dd)(3)	8149-D	8229-C,8767

Units and Topics of Instruction	Periods of Instruction	Essential Elements	Student Materials Level I	Student Materials Level II
D. Select and Apply Paint and Preservatives	5			
1. Select Paints and Preservatives	2	(dd)(6)	8150-A	8606,8224-A
2. Proper Application Methods and Safe Use of Paints and Preservatives	3	(dd)(6),(dd)(15)	8150-B	8606,8224-A
E. Installation and Maintenance of Agricultural Water Supply and Sanitation Systems	6			
1. Identify and Safely Perform Basic Plumbing Skills	3	(dd)(7),(dd)(15)	8151-A	8603,8618 8787-A,8233-B
2. Plan Establish and Maintain Water Management Systems	3	(dd)(7)	8151-B	8233-A,8233-B 8692-A,8692-C
F. Planning, Installation, and Maintenance of Electrical Wiring and Motors	20			
1. Basic Principles and Safe Use of Electricity	5	(dd)(8),(dd)(15)	8152-A	8231-A,8231-B
2. Planning Electrical Circuits and Equipment	5	(dd)(8)	8152-B	8231-B,8231-C
3. Installing and Repairing Electrical Circuits and Equipment	6	(dd)(8)	8152-C	8231-B,8231-C
4. Installing and Maintaining Electric Motors and Controls	4	(dd)(8)	8152-D	8795,8232-A
G. Concrete and Masonry Construction in Agriculture	9			
1. Planning Concrete Construction	3	(dd)(9)	8153-A	8230-A,8230-B
2. Placing, Finishing, and Curing Quality Concrete	3	(dd)(9)	8153-B	8230-C
3. Using Masonry Construction	3	(dd)(9)	8153-C	8769

Units and Topics of Instruction	Periods of Instruction	Essential Elements	Student Materials Level I	Student Materials Level II
H. Perform Electric Arc and Oxyfuel Welding and Soldering	23			
1. Oxyfuel Cutting and Welding Principles and Procedures	6	(dd)(10)	8154-A	8609-A,8782-A
2. Arc Welding Principles and Procedures	6	(dd)(10)	8154-B	8609-B,8609-C 8609-D,8227-A
3. Gas Arc Welding Principles and Procedures	6	(dd)(10)	8154-C	8783
4. Plasma Arc Cutting and Plasma Arc Welding Principles and Procedures	3	(dd)(10)	8154-D	8784
5. Soldering Principles and Procedures	2	(dd)(10)	8154-E	8785-A
I. Operation, Service, and Repair of Small Engines	18			
1. Principles of Operation of Two-stroke and Four-stroke Cycle Small Engines	4	(dd)(11)	8155-A	8203-A,8793-A
2. Maintain and Troubleshoot Small Engines	6	(dd)(11)	8155-B	8203-B,8793-B
3. Disassemble, Repair, and Reassemble Small Engines	6	(dd)(11)	8155-C	8203-C,8793-C
4. Compliance with Small Engine Safety Equipment Regulations	2	(dd)(11),(dd)(15)	8155-D	8155-D
J. Service and Maintain Agricultural Trucks, Tractors, and Equipment Component Systems	24			
1. Safe Operation and Maintenance of Agricultural Machinery and Equipment	3	(dd)(13),(dd)(15)	8156-A	8201-A,8201-B 8211-A
2. Service and Maintain the Intake and Exhaust Systems	2	(dd)(12)	8156-B	8208-D
3. Service and Maintain the Lubrication System	2	(dd)(12)	8156-C	8207-A
4. Service and Maintain the Cooling System	2	(dd)(12)	8156-D	8206-A
5. Service and Maintain the Fuel System	3	(dd)(12)	8156-E	8208-A,8208-B 8208-C
6. Service and Maintain the Electrical System	4	(dd)(12)	8156-F	8794-E,8209-A 8209-D
7. Service and Maintain the Power Train	2	(dd)(12)	8156-G	8204-A
8. Service and Maintain the Chassis, Braking, and Steering Systems	2	(dd)(12)	8156-H	8794-H,8204-A
9. Service and Maintain the Hydraulic System	2	(dd)(12)	8156-I	8794-G
10. Service and Maintain Tires and Wheels	2	(dd)(12)	8156-J	8206-B

Units and Topics of Instruction	Periods of Instruction	Essential Elements	Student Materials Level I	Student Materials Level II
K. Perform Farm Machinery and Equipment Inspections, Adjustments, and Reconditioning	8			
1. Identifying, Inspecting and Adjusting Agricultural Machinery and Equipment	4	(dd)(13)	8157-A	8792-A,8792-B 8792-E,8211-A
2. Repair and Reconditioning of Agricultural Machinery and Equipment	4	(dd)(13)	8157-B	8212-A,8224-A
L. Plan, Build, and Maintain Fences	8			
1. Planning, Building, and Maintaining Barbed and Woven Wire Fences	3	(dd)(14)	8158-A	8607
2. Planning, Building, and Maintaining Privacy, Residential and Commercial Fences	3	(dd)(14)	8158-B	8158-B
3. Planning, Building, and Maintaining Electric Fences	2	(dd)(14)	8158-C	8766
M. Plan and Conduct Leadership Activities Related to Agricultural Mechanics Related Occupations	8			
1. Develop Communication Skills	2	(a)(1)(A-D) (a)(5)(A-F) (dd)(16)	8373-A 8373-D	8373-A 8373-D
2. Develop Interpersonal Relations	2	(a)(1)(A-D) (a)(5)(A-F) (dd)(16)	8736-B	8736-B
3. Develop Qualities of Citizenship and Leadership	2	(a)(1)(A-D) (a)(5)(A-F) (dd)(16)	8374-A	8374-A
4. Develop Organizational Skills	2	(a)(1)(A-D) (a)(5)(A-F) (dd)(16)	8742-A	8742-A

Units and Topics of Instruction	Periods of Instruction	Essential Elements	Student Materials Level I	Student Materials Level II
N. Plan and Conduct Supervised Agricultural Experience Programs to Include Personal Financial Management and Explore Entrepreneurial and Career Opportunities	10			
1. Explore Entrepreneurial and Career Opportunities in Agricultural Mechanics	2	(a)(2)(A-L) (a)(3)(A-D) (a)(6)(A-I) (a)(7),(dd)(17)	8747-A 8220-A	8747-A 8220-A
2. Develop Personal Job Skills	2	(a)(2)(A-L) (3)(A-D) (a)(6)(A-I) (a)(7),(dd)(17)	8372-A	8372-A
3. Develop Financial Management Skills	2	(a)(2)(A-L) (a)(3)(A-D) (a)(6)(A-I) (a)(7),(dd)(17)	8375-B 8375-C	8375-B 8375-C
4. Develop SAEP Recordkeeping Skills	4	(a)(2)(A-L) (a)(3)(A-D) (a)(6)(A-I) (a)(7),(dd)(17)	8502,8002C 8002D,SAEPG	8502,8002C 8002D,SAEPG

AGRIBUSINESS 121 - AGRICULTURAL MECHANICS

UNIT A: RECOGNIZE AND PRACTICE SAFE WORK PRACTICES THAT APPLY TO AGRICULTURAL MECHANICS RELATED OCCUPATIONS

Topic A-1: Agricultural Mechanics: Importance, Safety and Laboratory Management (8147-A/8600)

Topic Goal:

The student shall be provided the opportunity to learn and apply safety practices and explore and reinforce laboratory management skills in agricultural mechanics.

Topic Objectives:

After completing the topic, the student shall be able to:

1. realize the importance of competencies in agricultural mechanics;
2. understand important laboratory rules and regulations;
3. develop safety awareness; and
4. practice good housekeeping and safety procedures while in the laboratory.

Topic A-2: Identify and Demonstrate Safe Use of Hand Tools (8147-B/8412)

Topic Goal:

The student shall be provided the opportunity to develop skills in identifying, selecting, and safe use of hand tools and equipment as they apply to agricultural mechanics.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the importance of tools;
2. identify common hand tools;
3. select proper hand tools for a specific task;
4. safely use and maintain hand tools; and
5. properly use measuring and marking tools.

Topic A-3: Identify and Demonstrate Safe Use of Power Tools (8147-C/8601-A)

Topic Goal:

The student shall be provided the opportunity to develop skills in identifying and safe use of power tools appropriate for agricultural mechanics.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify common power tools used in agricultural mechanics;
2. discuss safe and proper operation of common power tools; and
3. demonstrate proper use of power tools.

Topic A-4: Identify and Demonstrate Proper Use of Farm and/or Builder's Levels (8147-D/8771)

Topic Goal:

The student shall be provided the opportunity to develop skills on the proper use of a farm and/or builder's level in agricultural applications.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify different types of tripod levels and rods, and their basic parts;
2. set up and adjust a farm and/or builder's level;
3. discuss the use of new style laser beam levels;
3. identify common hand signals;
4. define terms related to the use of leveling and surveying equipment; and
5. properly use surveying and leveling equipment to stake out building lines, foundations, and fence lines.

UNIT B: IDENTIFY AND USE FASTENERS AND BUILDING MATERIALS

Topic B-1: Identify and Demonstrate Safe Use of Fasteners (8148-A/8617,8792-C)

Topic Goal:

The student shall be provided the opportunity to identify and use fasteners as applied to agricultural construction.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify, select, and safely use nails and staples;
2. identify, select, and safely use screws;
3. identify, select, and safely use bolts, nuts, and washers;
4. identify, select, and safely use rivets and corrugated fasteners; and
5. identify, select, and safely use framing anchors.

Topic B-2: Identify and Select Wood and Other Building Materials (8148-B/8229-B,8413)

Topic Goal:

The student shall be provided the opportunity to become familiar with types, patterns, and characteristics of lumber and other building materials, and calculate units of measure.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe lumber and plywood grades and types, and their applications;
2. discuss types of common roofing and siding materials and characteristics and applications of each;
3. calculate board and square feet;
4. compare types of insulation materials and their R-values; and
5. select suitable building materials for specific applications considering durability, strength, ease of application, cost, and appearance.

Topic B-3: Identify and Select Concrete and Masonry Building Materials (8148-C/8230-A,8230-B,8769)

Topic Goal:

The student shall be provided the opportunity to develop an understanding of the principles of concrete and masonry construction.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss advantages of using concrete and masonry in agricultural construction;
2. discuss the composition of cement and concrete;
3. describe the characteristics of quality concrete;
4. explain water-cement ratio and its effect on concrete quality;
5. compare the compression and tensile strength of concrete;
6. discuss the recommended strength of concrete used in various agricultural applications; and
7. discuss types and uses of concrete masonry blocks, bricks, tile, and building stone.

UNIT C: PLAN AND CONSTRUCT BUILDINGS AND EQUIPMENT

Topic C-1: Planning Buildings and Selecting Equipment (8149-A/8229-A,8229-B)

Topic Goal:

The student shall be provided the opportunity to develop an understanding of criteria to consider and procedures to follow in planning agricultural structures.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss factors to consider when planning and laying out a farmstead or agricultural business;
2. identify and discuss various types of buildings and designs used in agricultural structures;
3. discuss climatic conditions such as prevailing wind direction, wind velocity, average temperature, and average snow and rainfall to consider when designing agricultural structures;
4. list and discuss factors to consider in selecting a building site for agricultural structures;
5. discuss environmental, sanitation, and health issues associated with certain types of agricultural structures;
6. discuss national, state, and local zoning ordinances that may restrict the selection of a building site; and
7. describe overall managerial considerations that must be analyzed to determine the size, specifications, and layout of an agricultural structure.

Topic C-2: Drawing and Reading Building Plans for Cost Effective Construction (8149-B/8605-B,8786-A)

Topic Goal:

The student shall be provided the opportunity to learn graphic ways of presenting a design or plan to be used in the planning and construction of agricultural structures.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the purpose and importance of building plans or drawings;
2. describe different types of plans or drawings used in construction planning;
3. describe and understand principle views of two and three-dimensional plans, sketches, and working drawings;
4. read and interpret plans and working drawings;
5. identify common symbols and abbreviations used in plans and drawings;
6. describe the use of different scales in detailed construction drawings and plans;
7. analyze a plan or drawing; and
8. draw a set of plan for a proposed wood or metal project.

Topic C-3: Computing a Bill of Materials (8149-C/8413,8229-B,8605-B,8786-A)

Topic Goal:

The student shall be provided the opportunity to understand criteria and procedures for the selection of building materials and development of a bill of materials.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the meaning of a bill of materials, how it is prepared, and the units of measure used;
2. discuss the different ways of using a bill of materials and the different types of information needed for each;
3. realize importance of developing the different types of bill of materials;
4. select suitable building materials for specific applications considering durability, strength, ease of application, cost, and appearance; and
5. develop a bill of materials for a proposed wood or metal fabrication project.

Topic C-4: Construction of Agricultural Structures (8149-D/8229-C,8767)

Topic Goal:

The student shall be provided the opportunity to learn construction principles and develop skills necessary to construct and repair agricultural structures.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify structural parts of agricultural buildings or structures;
2. demonstrate the safe operation of hand and power tools and equipment used in the construction and repair of agricultural structures;
3. discuss types of construction joints and the use of different types of fasteners;
4. describe building site preparation and building layout procedures;

5. describe roof layout and construction procedures; and
6. demonstrate skills needed to layout, construct, and repair agricultural structures.

UNIT D: SELECT AND APPLY PAINT AND PRESERVATIVES

Topic D-1: Select Paints and Preservatives (8150-A/8606,8224-A)

Topic Goal:

The student shall be provided the opportunity to gain an understanding and develop skills in the selection and use of paints and preservatives in various agricultural applications.

Topic Objectives:

After completing the topic, the student shall be able to:

1. recognize importance of selecting and using the proper paints or preservatives;
2. discuss types of paints and preservatives and their uses in various agricultural applications;
3. discuss importance of selecting proper solvent and thinners;
4. discuss the latest safety regulations concerning the storage and use of different types of paint and painting equipment; and
5. select proper paints, preservatives, thinners, and solvents for specific agricultural applications.

Topic D-2: Proper Application Methods and Safe Use of Paints and Preservatives (8150-B/8606,8224-A)

Topic Goal:

The student shall be provided the opportunity to learn the knowledge and skills necessary to clean and paint agricultural buildings and equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss different paint application methods;
2. describe problems encountered in surface preparation and in applying paints and preservatives;
3. properly prepare surfaces to be painted;
4. discuss various surface cleaning procedures;
5. explain and demonstrate brush painting techniques;
6. identify major parts and discuss operation of modern types of paint spraying equipment;
7. properly apply paints and preservatives using brush, pressure spray gun and airless methods; and
8. properly clean and safely store painting supplies and painting equipment.

UNIT E: INSTALLATION AND MAINTENANCE OF AGRICULTURAL WATER SUPPLY AND SANITATION SYSTEMS

Topic E-1: Identify and Safely Perform Basic Plumbing Skills (8151-A/8603,8618,8787-A,8233-B)

Topic Goal:

The student shall be provided the opportunity to learn basic theory and specialized skills practiced in plumbing.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the existence of plumbing and sanitation codes, and permit requirements;
2. discuss the common types of water supply and plumbing systems used on farms, ranches, and other agricultural businesses;
3. identify plumbing tools and supplies, and describe their proper uses;
4. identify different types of pipe, pipe fittings, valves, and other plumbing fixtures, and describe their uses;
5. discuss common plumbing problems, their causes, and possible solutions;
6. demonstrate procedures to properly cut and assemble metal, copper, and plastic pipe using various types of fittings and connections;
7. describe and demonstrate procedures to install, repair and replace plumbing fixtures; and
8. understand components of a sewage disposal system.

Topic E-2: Plan, Establish, and Maintain Water Management Systems (8151-B/8233-A,8233-B,8692-A,8692-C)

Topic Goal:

The student shall be provided the opportunity to develop an understanding of how to plan and monitor an irrigation and rural water system.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify five types of wastes;
2. define the term wastewater;
3. describe different agricultural waste management systems;
4. discuss sources and quality of water for rural household, crop, and livestock needs;
5. discuss evaporation and evapotranspiration;
6. discuss soil permeability and infiltration rates;
7. discuss practical and environmental concerns associated with confinement livestock operations;
8. identify and discuss the use of a septic tank, a drain field, and a dry waste treatment systems; and
9. identify major sources of agricultural waste in your area, and list possible suggestions for their proper disposal.

UNIT F: PLANNING, INSTALLATION, AND MAINTENANCE OF ELECTRICAL WIRING AND MOTORS

Topic F-1: Basic Principles and Safe Use of Electricity (8152-A/8231-A,8231-B)

Topic Goal:

The student shall be provided the opportunity to fully realize how dependent we are on electricity and learn the principles, terminology, and safety necessary for working with electricity.

Topic Objectives:

After completing the topic, the student shall be able to:

1. define common electrical terms;
2. discuss different methods of generating electrical current;
3. discuss relationships between electricity and magnetism;
4. discuss the manufacture and distribution of electrical current for home and business use;
5. understand and describe different electrical circuits;
6. explain the three types of circuit failures;
7. discuss the relationships among, volts, ohms, amperage, and wattage;
8. explain the basic differences between electrical and electronic circuits.
9. discuss purposes of the National Fire Protection Association, Underwriter's Laboratories, and the American National Standards Institute;
10. describe the importance of the NEC, local electrical codes and the use of U_L approved supplies; and
11. explain electrical shock and the importance of using proper current overload and ground fault circuit interrupter (GFCI) equipment;

Topic F-2: Planning Electrical Circuits and Equipment (8152-B/8231-B,8231-C)

Topic Goal:

The student shall be provided the opportunity to gain an understanding and develop skills necessary to plan for the installation of electrical circuits and equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. list and describe the different environments that agricultural electrical equipment must operate in;
2. discuss the purpose of grounding an electrical circuit;
3. describe the difference in the system ground/neutral conduct and the equipment safety ground conductor;
4. identify and describe the main parts of a service entrance, a feeder circuit and a branch circuit;
5. describe the three general types of branch circuits;
6. identify and describe the operation of different types of circuit protection and control devices; and
7. calculate the size of branch circuits needed and determine proper wire size.

Topic F-3: Installing and Repairing Electrical Circuits and Equipment (8152-C/8231-B,8231-C)

Topic Goal:

The student shall be provided the opportunity to gain an understanding and develop skills necessary to properly install and repair electrical circuits and equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify different types of electrical wiring and describe the appropriate use in home and agricultural wiring applications;
2. identify tools and equipment used in electrical installation and repair and discuss the safe and proper use of each;
3. identify different types of electrical conduit, junction boxes, outlets, covers, and discuss appropriate uses for each;
4. identify different types of special purpose electrical switches and control devices and discuss their operation;
5. select the proper electrical equipment and supplies for an application based on the anticipated operating environment;
6. discuss and demonstrate proper wire connection and splicing procedures;
7. demonstrate ability to properly layout, install, and repair electric circuits, lights, switches, controls, conduit, wiring, and overcurrent protection devices; and
8. demonstrate ability to measure and troubleshoot electrical circuits using proper testing equipment and measuring devices.

Topic F-4: Installing and Maintaining Electric Motors and Controls (8152-D/8795,8232-A)

Topic Goal:

The student shall be provided the opportunity to develop an understanding of how to properly select, install and maintain electrical motors and controls for a particular application.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the use of electric motors in various agricultural applications and operating conditions;
2. list factors associated with electric motor and control selection;
3. calculate the cost of operation of an electric motor;
4. identify different types of electrical motors and describe the application of each;
5. identify common types of electric motor control devices and explain the basic operation of each;
6. interpret the information provided on electrical motor name plates and wiring diagrams;
7. install electric motors, controls, and overcurrent protection equipment; and
8. clean, service, and lubricate an electrical motor.

UNIT G: CONCRETE AND MASONRY CONSTRUCTION IN AGRICULTURE

Topic G-1: Planning Concrete Construction (8153-A/8230-A,8230-B)

Topic Goal:

The student shall be provided the opportunity to understand criteria and procedures to analyze a situation, plan, and mix quality concrete.

Topic Objectives:

After completing the topic, the student shall be able to:

1. calculate the quantity of ready mixed concrete needed for various types of construction projects;
2. calculate the quantity of the various ingredients needed if the concrete is to be mixed on job site;
3. explain necessary steps for proper site preparation;
4. discuss the need for footings and foundations;
5. describe proper sub-grade preparation procedures;
6. discuss guidelines for concrete form construction;
7. discuss the purpose of reinforcing concrete;
8. identify different types and sizes of reinforcement materials and discuss their uses;
9. describe the use of construction, control, and isolation joints in concrete construction; and
10. discuss the use of thickened edges in concrete slab work;

Topic G-2: Placing, Finishing, and Curing Quality Concrete (8153-B/8230-C)

Topic Goal:

The student shall be provided the opportunity to understand and apply procedures for properly constructing forms and reinforcing, placing, finishing, and curing concrete in agricultural applications.

Topic Objectives:

After completing the topic, the student shall be able to:

1. construct concrete forms;
2. describe proper concrete placement, finishing, and curing procedures and precautions;
3. identify tools and equipment used in concrete construction and describe their uses;
4. describe common problems associated with concrete and masonry construction and steps used to prevent them; and
5. demonstrate ability to properly mix, place, finish, and cure concrete.

Topic G-3: Using Masonry Construction (8153-C/8769)

Topic Goal:

The student shall be provided the opportunity to understand and apply procedures used in masonry construction in agricultural applications.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss importance and applications for concrete masonry construction;
2. identify types of brick and concrete masonry blocks;
3. discuss proper mortar mixing and placement procedures;
4. describe brick and concrete masonry block layout procedures;
5. estimate the number of concrete masonry blocks needed for a job;
6. identify tools and equipment used in masonry construction and describe their uses; and
7. demonstrate ability to properly mix mortar and place bricks and concrete masonry blocks.

UNIT H: PERFORM ELECTRIC ARC AND OXYFUEL WELDING AND SOLDERING

Topic H-1: Oxyfuel Cutting and Welding Principles and Procedures (8154-A/8609-A,8782-A)

Topic Goal:

The student shall be provided the opportunity to learn and apply safe practices as they relate to oxyfuel cutting and welding.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe the characteristics of oxygen, acetylene, and other fuels used in the oxyfuel cutting and welding processes;
2. identify and discuss the operation of oxyfuel cutting and welding equipment;
3. discuss safety precautions for oxyfuel cutting and welding processes;
4. properly assemble oxyfuel equipment;
5. safely demonstrate correct set up and turn off procedures of oxyfuel equipment;
6. describe the oxyfuel cutting and welding processes and positions;
7. select proper cutting and welding tips and oxyfuel operating pressures;
8. describe procedures for preparing different types and shapes of metal for oxyfuel welding; and
9. safely demonstrate oxyfuel cutting and welding procedures.

Topic H-2: Arc Welding Principles and Procedures (8154-B/8609-B,8609-C,8609-D,8227-A)

Topic Goal:

The student shall be provided the opportunity to develop skills in selecting and safely using electric arc welding equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe the basic arc welding or fusion welding process;
2. identify and describe basic types of arc welding machines;
3. discuss arc welding safety practices;
4. describe the shielded metal arc welding (SMAW) principles and procedures using AC and DC machines;
5. discuss types, classifications, sizes, uses, and selection criteria for arc welding electrodes;
6. identify and describe different arc welding positions, and joints;
7. describe the process of preparing different types, thickness, and shapes of metals for arc welding;
8. describe procedures used to control distortion when welding;
9. describe arc cutting and hard-surfacing procedures; and
10. safely demonstrate SMAW welding procedures.

Topic H-3: Gas Arc Welding Principles and Procedures (8154-C/8783)

Topic Goal:

The student shall be provided the opportunity to learn and safely practice proper methods of gas arc welding.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe the basic gas arc welding process and its advantages over SMAW;
2. identify basic parts of a gas metal arc welding (GMAW) or MIG welding machine and describe their operation;
3. identify basic parts of a gas tungsten arc welding (GTAW) or TIG welding machine and describe their operation;
4. discuss gas arc welding safety precautions and practices; and
5. safely demonstrate GMAW and GTAW procedures.

Topic H-4: Plasma Arc Cutting and Plasma Arc Welding Principles and Procedures (8154-D/8784)

Topic Goal:

The student shall be provided the opportunity to become familiar with plasma arc cutting and welding procedures and equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe plasma arc cutting (PAC) and plasma arc welding(PAW) principles;
2. identify basic parts of plasma arc cutting (PAC) and plasma arc welding (PAW) equipment and describe their basic operation;
3. discuss safety practices and procedures to follow when using plasma arc cutting and welding equipment;
4. discuss advantages of using plasma arc cutting; and
5. safely demonstrate plasma arc cutting and welding procedures.

Topic H-5: Soldering Principles and Procedures (8154-E/8785-A)

Topic Goal:

The student shall be provided the opportunity to become familiar with the procedures and equipment used when soldering.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the uses of soldering procedures in modern agricultural equipment and structures repair or construction;
2. list the different types of solder and describe their uses;
3. identify common soldering equipment and describe their different uses;
4. describe the soldering process;
5. discuss safety precautions to be followed when using soldering equipment;
6. discuss the different types of solder joints;
7. demonstrate proper method of filing and tinning a soldering copper; and
8. safely demonstrate soldering procedures.

UNIT I: OPERATION, SERVICE, AND REPAIR OF SMALL ENGINES

Topic I-1: Principles of Operation of Two-stroke and Four-stroke Cycle Small Engines (8155-A/8203-A,8793-A)

Topic Goal:

The student shall be provided the opportunity to learn principles of operation of two-stroke and four-stroke cycle engines.

Topic Objectives:

After completing the topic, the student shall be able to:

1. list uses of small engines in agricultural applications;
2. identify basic parts of small two-stroke and four-stroke cycle engines;

3. distinguish between the operating principles and strokes of two-stroke and four-stroke cycle engines;
4. name the operating strokes of two-stroke and four-stroke cycle engines; and
5. describe the basic operation of the fuel, ignition, cooling and lubrication system of different types of small engines.

Topic I-2: Maintain and Troubleshoot Small Engines (8155-B/8203-B,8793-B)

Topic Goal:

The student shall be provided the opportunity to service and maintain component systems of small engines.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the reasons for maintaining small engines;
2. discuss causes for part or system failures;
3. discuss steps to follow in troubleshooting a system failure;
4. discuss the importance of consulting the proper operator's and/or service manuals while maintaining or troubleshooting small engines; and
5. service and maintain component systems of small engines according to operator's and/or service manual recommendations.

Topic I-3: Disassemble, Repair, and Reassemble Small Engines (8155-C/8203-C,8793-C)

Topic Goal:

The student shall be provided the opportunity to disassemble, analyze component wear, and reassemble a small engine.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the preliminary steps of engine disassembly and repair;
2. discuss importance of using a service manual, proper tools, and following a systematic procedure while disassembling, inspecting, and measuring component parts of a small engine;
3. disassemble and inspect component parts of a small engine;
4. locate clearances and wear tolerances of small engine components in an appropriate service manual;
5. measure and analyze conditions of component parts of a small engine;
6. properly install new or reconditioned component parts; and
7. properly reassemble and adjust small engine component parts and systems as outlined in a service manual.

Topic I-4: Compliance with Small Engine Safety Equipment Regulations (8155-D)

Topic Goal:

The student shall be provided the opportunity to inspect and adjust safety equipment used on small engine powered machinery.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the purpose for safety devices installed on small engine powered equipment;
2. list and describe different types of safety devices installed on small engine powered equipment;
3. discuss legal concerns of removing or altering safety devices; and
4. troubleshoot, repair, and adjust safety devices according to specifications outlined in an operator's and/or service manual.

UNIT J: SERVICE AND MAINTAIN AGRICULTURAL TRUCKS, TRACTORS AND EQUIPMENT COMPONENT SYSTEMS

Topic J-1: Safe Operation and Maintenance of Agricultural Machinery and Equipment (8156-A/8201-A,8201-B,8211-A)

Topic Goal:

The student shall be provided the opportunity to learn and apply knowledge and skills necessary for safe operation and maintenance of agricultural machinery and equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. list and discuss common types of agricultural tractor and equipment accidents;
2. list and discuss safe agricultural tractor and equipment operating practices and procedures;
3. interpret the meaning of different words, shapes, symbols, and colors used with agricultural equipment controls, emblems, signal words, gauges, decals, and instrument panel displays;
4. discuss the use of electronic sensors and on-board computers to monitor equipment operating conditions;
5. list common causes of breakdowns and failures;
6. list and describe different types of preventive maintenance and service procedures;
7. locate preventive maintenance and service information and procedures in an operator's manual;
8. discuss proper storage and disposal procedures for used solvents, coolants, lubricating oil, batteries, and other chemicals;
9. demonstrate ability to properly perform preventive maintenance and safety checks on agricultural tractors and equipment;
10. demonstrate ability to properly operate and transport agricultural tractors and equipment; and
11. communicate non-verbally using ASAE hand signals.

Topic J-2: Service and Maintain Intake and Exhaust Systems (8156-B/8208-D)

Topic Goal:

The student shall be provided the opportunity to understand the basic operation of engine air intake and exhaust systems and how to service and maintain them.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify the parts of air intake systems and describe their operation;
2. describe the operation of dry element and oil bath air filtering systems;
3. identify the parts of a basic exhaust system and describe their operation;
4. discuss procedures related to intake and exhaust system maintenance as outlined in an appropriate operator's manual;
5. discuss intake and exhaust valve adjustment procedures; and
6. demonstrate procedures to properly service an intake and exhaust system.

Topic J-3: Service and Maintain the Lubrication System (8156-C/8207-A)

Topic Goal:

The student shall be provided the opportunity to learn the value of lubricants and to develop the skills associated with lubrication system service and maintenance.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe the functions of engine lubricants;
2. discuss the selection of engine lubricants bases on quality designation and viscosity;
3. identify the parts of a basic engine lubrication system and describe their operation;
4. discuss proper procedures for servicing the engine lubrication system as outlined in an appropriate operator's manual; and
5. demonstrate procedures to properly service an engine lubrication system.

Topic J-4: Service and Maintain the Cooling System (8156-D/8206-A)

Topic Goal:

The student shall be provided the opportunity to understand the operation of air and liquid cooling systems and how to properly service and maintain them.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe the principles of heat transfer as related to liquid and air-cooled engines;
2. identify parts of an air-cooled engine cooling system and describe their function;
3. identify parts of a liquid cooling system and describe their function;
4. discuss the purpose of antifreeze, coolants and other cooling system additives;
5. describe steps and procedures to properly check and service a cooling system as outlined in an appropriate operator's manual; and
6. analyze the condition of a cooling system and properly service it.

Topic J-5: Service and Maintain the Fuel Systems (8156-E/8208-A,8208-B,8208-C)

Topic Goal:

The student shall be provided the opportunity to learn how gasoline, diesel, LP, and compressed natural gas (CNG) fuel systems operate and procedures to properly service and maintain them.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify types of fuel systems used on agricultural equipment and explain their basic differences and similarities;
2. discuss the types and grades of common agricultural engine fuels;
3. identify basic parts of the different fuel systems and describe their operation;
4. describe basic service procedures for gasoline, LP-Gas, CNG and diesel fuel systems as outlined in an appropriate operator's manual;
5. perform basic maintenance procedures on different types of fuel systems; and
6. discuss procedures for safe and efficient fuel storage and handling.

Topic J-6: Service and Maintain the Electrical System (8156-F/8794-E,8209-A,8209-D)

Topic Goal:

The student shall be provided the opportunity to develop an understanding of the operation of electrical ignition and accessory systems, and proper procedures to maintain and service them.

Topic Objectives:

After completing the topic, the student shall be able to:

1. identify components of different electrical systems used on agricultural equipment and describe their basic operation;
2. list and describe the basic operation of the three types of spark ignition systems;
3. discuss the different heat ranges of spark plugs and describe their uses;
4. discuss the importance of proper engine ignition timing and spark plug adjustment;
5. list types of charging systems and briefly describe their operation;
6. discuss why proper battery maintenance procedures are important;
7. describe the operation of different types of electrical and electronic gauges, monitors, sending units, and switches used in electrical accessory circuits;
8. describe common types of electrical system failures;
9. describe the proper use of tools, meters and equipment to test and service the electrical system; and
10. properly service ignition, charging, and accessory electrical systems as outlined in an appropriate operator's manual.

Topic J-7: Service and Maintain the Power Train (8156-G/8204-A)

Topic Goal:

The student shall be provided the opportunity to gain an understanding of the operation of a power train and develop service and maintenance skills.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe basic principles of power transfer;
2. identify basic parts of different types of clutches, transmissions, differentials, and final drives and describe their operation;
3. discuss the types, grades, and different viscosities of power train lubricants;
4. discuss different sizes and types of power take off systems;
5. discuss proper procedures for servicing and adjusting a power train as outlined in an appropriate operator's manual; and
6. properly service and adjust power train components.

Topic J-8: Service and Maintain the Chassis, Braking, and Steering Systems (8156-H/8794-H,8204-A)

Topic Goal:

The student shall be provided the opportunity to learn safe operation, maintenance, and repair procedures of the chassis, braking and steering systems.

Topic Objectives:

After completing the topic, the student shall be able to:

1. explain the importance of chassis, braking, and steering system maintenance;
2. identify basic parts of common braking and steering systems and describe their operation;
3. discuss the importance of proper toe-in on operation and safety of agricultural tractors and equipment;
4. discuss proper service and adjustment procedures for chassis, braking, and steering systems as outlined in appropriate operator's manuals; and
5. properly service and lubricate chassis, steering, and braking systems.

Topic J-9: Service and Maintain the Hydraulic System (8156-I/8794-G)

Topic Goal:

The student shall be provided the opportunity to understand basic principles of hydraulics, the operation and the function of component parts, and skills necessary to service hydraulic systems.

Topic Objectives:

After completing the topic, the student shall be able to:

1. describe the basic principles of hydraulics;
2. identify component parts of a hydraulic system and describe their operation;
3. describe the differences in an open and a closed hydraulic system;
4. describe the proper procedures for checking external leaks in a hydraulic system;

5. discuss the grades, types and viscosity of hydraulic fluids and their "multiple" purposes in modern agricultural tractors and self-propelled equipment;
6. explain why dirt, grit, moisture and small metal wear particles can damage the hydraulic system;
7. explain the relationships between other power train failures and hydraulic system failures;
8. discuss proper hydraulic system service procedures as outlined in an appropriate operator's manual; and
9. perform hydraulic system service procedures on agricultural equipment.

Topic J-10: Service and Maintain Tires and Wheels (8156-J/8206-B)

Topic Goal:

The student shall be provided the opportunity to understand the importance of proper tire and wheel selection and maintenance for safe and efficient operation of farm equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. list and describe the two general classes of tires used in agricultural applications;
2. discuss the difference in bias ply and radial ply tire construction;
3. describe the tire industry size and type codes used for "off-the-road" and "over-the-road" tires;
4. discuss the load rating, load range, and ply-rating designations and the importance of proper tire selection;
5. discuss common causes of tire and wheel failure;
6. describe the use of ballast on off-the-road agricultural equipment;
7. discuss the importance of proper torque of lug bolts or wheel clamps; and
8. check tire inflation, lug bolt torque, and inspect tires and wheels for damage as outlined in an appropriate operator's manual.

UNIT K: PERFORM FARM MACHINERY AND EQUIPMENT INSPECTIONS, ADJUSTMENTS, AND RECONDITIONING

Topic K-1: Identifying, Inspecting, and Adjusting Agricultural Machinery and Equipment (8157-A/8792-A,8792-B,8792-E,8211-A)

Topic Goal:

The student shall be provided the opportunity to identify different types of agricultural machinery, discuss their principles of operation, and perform inspection and adjustment procedures.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss the purpose of different types of agricultural equipment;
2. identify and describe the basic principles of operation of agricultural equipment and accessories common to the local community;
3. discuss the various uses of electronic computerized information systems on agricultural equipment;
4. discuss the importance of periodic inspection, calibration, and adjustment for the proper operation of agricultural equipment;

5. locate safety, inspection, and adjustment procedures in an appropriate operator's manual;
6. discuss the importance of following all safety precautions, disengaging the power supply and stopping the engine before making any inspections and adjustments; and
7. perform inspection and adjustment procedures on agricultural equipment as outlined in an appropriate operator's manual.

Topic K-2: Repair and Reconditioning of Agricultural Machinery and Equipment (8157-B/8212-A,8224-A)

Topic Goal:

The student shall be provided the opportunity to develop an understanding of procedures and skills necessary to repair and recondition agricultural equipment.

Topic Objectives:

After completing the topic, the student shall be able to:

1. demonstrate safe use of stands, jacks, and other safety equipment when working around and under agricultural equipment;
2. properly clean equipment for repair and reconditioning procedures;
3. locate and interpret troubleshooting, repair, and adjustment procedures outlined in an operator's and/or technical manual;
4. locate and identify proper part and assemble component numbers needed to complete a repair job using parts manuals, catalogs, microfiche, and/or computer;
5. prepare a list of parts and supplies needed to complete a repair job;
6. properly use measuring tools, test instrument, operator's and technical manuals, etc., to diagnose and repair equipment conditions;
7. draw sketches, diagrams or schematic drawings of equipment to aid in the disassembly and reassemble process;
8. repair and recondition agricultural equipment; and
9. repaint reconditioned agricultural equipment.

UNIT L: PLAN, BUILD, AND MAINTAIN FENCES

Topic L-1: Planning, Building, and Maintaining Barbed, and Woven Fences (8158-A/8607)

Topic Goal:

The student shall be provided the opportunity to develop skills in selecting materials and planning, and constructing fences appropriate for diversified agricultural operations.

Topic Objectives:

After completing the topic, the student shall be able to:

1. understand the importance of fences;
2. list the steps in planning a fence layout;
3. describe different types of fences used in agricultural operations;
4. identify and describe the safe use of fence construction tools;
5. identify and describe the use of common fence building materials;
6. discuss the steps involved in fence construction;
7. determine the type and amount of line posts and wire required to construct various types of fences;
8. discuss the maintenance and repair of fences;
9. describe safe methods of stretching, fastening, and splicing wire; and
10. describe and/or demonstrate safe fence building procedures.

Topic L-2: Planning, Building, and Maintaining Privacy, Residential and Commercial Fencing (8158-B)

Topic Goal:

The student shall be provided the opportunity to develop the knowledge and skills necessary to safely construct privacy and security fences around residential and commercial buildings.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss types of fencing used around residential and commercial buildings;
2. identify tools and materials needed to construct security and privacy fences;
3. discuss procedures for planning and laying out a chain link fence; and
4. describe and/or demonstrate procedures to construct chain link fences.

Topic L-3: Planning, Building, and Maintaining Electric Fences (8158-C/8766)

Topic Goal:

The student shall be provided the opportunity to evaluate and select electric fence components for specific needs and construct electric fences.

Topic Objectives:

After completing the topic, the student shall be able to:

1. explain the purpose of an electric fence;
2. discuss the advantages and disadvantages of electric fencing;
3. describe common types of electric fence controllers and power sources;
4. discuss training livestock to respect electric fences;
5. describe methods of grounding electric fences;
6. describe lightning protection for electric fences;
7. identify and describe common materials used to construct electric fences; and
8. describe and/or demonstrate common electric fence building procedures.

UNIT M: PLAN AND CONDUCT LEADERSHIP ACTIVITIES RELATED TO AGRICULTURAL MECHANICS OCCUPATIONS

Topic M-1: Develop Communication Skills (8373-A,8373-D)

Topic Goal:

The student shall be provided the opportunity to identify and improve effective oral and written communication skills.

Topic Objectives:

After completing the topic, the student shall be able to:

1. recognize the importance of effective written and oral communication;
2. discuss the different types of oral communication;
3. recognize the part good listening skills will have on effective written and oral communication;
4. identify poor and good speaking qualities;

5. discuss the different types of written communications and their purposes; and
6. list basic steps to follow when writing.

Topic M-2: Develop Interpersonal Relations (8736-B)

Topic Goal:

The student shall be provided the opportunity to learn and develop skills necessary for interpersonal relationships.

Topic Objectives:

After completing the topic, the student shall be able to:

1. explain the reasons for understanding and respecting the views, ideas, and cultural differences of others;
2. describe the importance of establishing a positive self-image and positive image of others; and
3. discuss ways leaders can deal with disturbing behaviors.

Topic M-3: Develop Qualities of Citizenship and Leadership (8374-A)

Topic Goal:

The student shall be provided the opportunity to develop life skills necessary for effective leadership and participate in leadership activities in agricultural mechanics through the FFA.

Topic Objectives:

After completing the topic, the student shall be able to:

1. realize the importance of effective life skills;
2. recognize life skills necessary for effective leadership;
3. evaluate personal life skills acquired;
4. recognize leadership and personal life skills development opportunities; and
5. participate in various activities to further develop leadership skills.

Topic M-4: Develop Organizational Skills (8742-A)

Topic Goal:

The student shall be provided the opportunity to identify the structure of a group or organization and to recognize different degrees of activity or participation by its members.

Topic Objectives:

After completing the topic, the student shall be able to:

1. define the boundaries of group or organizational membership;
2. discuss means of attracting people to group membership; and
3. describe methods of maintaining group membership and increasing individual participation.

UNIT N: PLAN AND CONDUCT SUPERVISED AGRICULTURAL EXPERIENCE PROGRAMS TO INCLUDE PERSONAL FINANCIAL MANAGEMENT AND EXPLORE ENTREPRENEURIAL AND CAREER OPPORTUNITIES

Topic N-1: Explore Entrepreneurial and Career Opportunities in Agricultural Mechanics (8747-A,8220-A)

Topic Goal:

The student shall be provided the opportunity to become familiar with the characteristics of entrepreneurs and to discuss entrepreneurial and career opportunities available in agricultural mechanics related occupations.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss factors that motivate entrepreneurs and self-employment;
2. identify characteristics of an entrepreneur;
3. discuss the importance of agricultural mechanics to American and World Agriculture; and
4. discuss different entrepreneurial and career opportunities available in agricultural mechanics related occupations.

Topic N-2: Develop Personal Job Skills (8372-A)

Topic Goal:

The student shall be provided the opportunity to understand importance of professional and ethical work habits, and employee-employer and employee-employee relationships.

Topic Objectives:

After completing the topic, the student shall be able to:

1. discuss importance of proper employee-employer relationships;
2. discuss importance of proper employee-employee relationships;
3. list good traits of an employee; and
4. list items that should be provided by a good employer.

Topic N-3: Develop Financial Management Skills (8375-B,8375-C)

Topic Goal:

The student shall be provided the opportunity to describe the importance of budgeting and personal finance skills and procedures to develop them.

Topic Objectives:

After completing the topic, the student shall be able to:

1. recognize advantages of planning a budget;
2. describe categories of a sample budget;
3. discuss the process of using checking, savings, and credit accounts in personal finances; and
4. secure informations on the different types of checking, savings, and credit accounts from financial institutions.

Topic N-4: Develop SAEP Recordkeeping Skills (8502,8002C,8002D,SAEP-G)

Topic Goal:

The student shall be provided the opportunity to understand the importance of a supervised agricultural experience program and recordkeeping skills.

Topic Objectives:

After completing the topic, the student shall be able to:

1. recognize the importance of supervised agricultural experience program records as a means of skill development and to explore entrepreneurial and career opportunities;
2. recognize characteristics of a successful supervised agricultural experience program;
3. satisfy state requirements for a supervised agricultural experience program;
4. demonstrate proper recordkeeping skills; and
5. maintain records of the supervised agricultural experience program.

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